

DØ Upgrade Monthly Progress Report

for the month of December, 1999

Subsystem: Master Schedule and Overview
WBS: All
Date Submitted: 1/24/00
Submitted By: Harry Weerts, Bill Freeman

<u>Done</u>	<u>Reportable Milestone</u>	<u>Date</u>	<u>Baseline</u>	<u>Variance</u>
X	M2-Central Preshower Module Fabrication Complete	12/16/97	12/16/97	0 w
X	M2-Central Preshower Installed on Solenoid	5/21/98	5/21/98	0 w
	M3-Level Ø-South Installed	3/9/00	2/9/00	4.2 w
	M2-Muon End Toroids Installed on Platform	11/15/00	11/15/00	0.2 w
	M1-Begin Shield Wall Removal/Ready to Roll-in	12/6/00	11/22/00	1.6 w
	M1-Detector Rolled-in and Hooked Up	2/6/01	2/2/01	0.4 w

Note: the full set of reportable milestones are collected and sorted by date at the end of this report.

Areas of Concern

Technical

Refer to WBS level 3 system reports.

Schedule

- The central silicon detector remains on the critical path to roll-in.
- In response to directives from DoE and the Laboratory management, efforts have begun to develop fallback plans should certain pieces of the project appear likely to incur unacceptable delays. All detector subsystems are being re-examined.
- Following an installation and commissioning review, the installation plans are being re-evaluated to identify possible alternative schemes that could create additional schedule contingency.

Resources

The installation and commissioning review identified several areas where more technical manpower is needed. An official request for more manpower was not submitted to the Laboratory because we need to see how much of that manpower can be identified within the collaboration.

Cost

Use of contingency remains a concern.

Change Requests

None

Progress Summary

During preparation for the Installation and Commissioning Director's Review on December 7 and 8, 1999 we identified several ways to change the DØ installation sequence. These options could result in the creation of several weeks of contingency for the completion date of the silicon detector. The final conclusions from this work will be presented at the second PMG meeting in January 2000.

- Production of A-layer MDT octants began.
- Fiber tracker fabrication has reached a steady production phase for the manufacturing of ribbons and the mounting of ribbons on support cylinders.
- Silicon ladder manufacture is close to becoming a production process.

DØ Upgrade Monthly Progress Report

for the month of December, 1999

Subsystem: Solenoid
WBS: 3.1.1
Date Submitted: 1/17/00
Submitted By: Gene Fisk

<u>Done</u>	<u>Reportable Milestone</u>	<u>Date</u>	<u>Baseline</u>	<u>Variance</u>
X	M1-Solenoid Delivered to Fermilab	5/12/97	5/12/97	0 w
X	M1-Solenoid Installed and Tested	9/30/98	9/30/98	0 w

Areas of Concern

The Be beam tube, the only part of the AIP that remains to be completed, has been returned to the vendor for cleaning, further inspection, bakeout and leak checking.

Technical

Before the beam tube was returned to Brush-Wellman Electrofusion (BWE), Fermilab was able to obtain vacuum connections at room temperature using Cu seals instead of Al. This approach must be verified with the bakeout procedure at temperatures up to 300 °C.

Schedule

The beam tube has been returned only recently and we will understand its schedule for further work after BWE completes their inspection and cleaning procedures.

Resources

BWE personnel are prepared to work on these problems.

Cost

We do not expect a significant cost increase in rectifying these problems. The conditions the vendor must satisfy are clearly stated in their contract with Fermilab.

Change Requests

A request for extension of the Solenoid AIP has been granted.

Progress Summary

With the ability to make vacuum using Cu seals we now know there are not leaks in the Be sections of the pipe. This suggests that major rework of the pipe will not be needed. However, this must be verified after the cleaning and bakeout procedures have been done.

All other progress on the Solenoid project proceeds without problems.

DØ Upgrade Monthly Progress Report

for the month of December, 1999

Subsystem: Silicon Tracker
WBS: 1.1.1
Date Submitted: 1/6/00
Submitted By: Marcel Demarteau, Ron Lipton

<u>Done</u>	<u>Reportable Milestone</u>	<u>Date</u>	<u>Baseline</u>	<u>Variance</u>
X	H Half-Wedge Fabrication 20% Complete	10/15/99	10/15/99	0 w
X	3 Chip Ladder Fabrication 80% Complete	10/26/99	10/20/99	0.6 w
X	9 Chip Ladder Fabrication 20% Complete	11/4/99	11/3/99	0.2 w
	6 Chip Ladder Fabrication 20% Complete	1/19/00	1/3/00	2.35 w
	F Wedge Assemblies 20% Complete	1/24/00	1/19/00	0.5 w
	M2-First Silicon Tracker Barrel/Disk Module Complete	2/2/00	1/24/00	1.4 w
	9 Chip Ladder Fabrication 80% Complete	3/10/00	3/27/00	-2.2 w
	6 Chip Ladder Fabrication 80% Complete	3/21/00	3/14/00	1 w
	H Half-Wedge Fabrication 80% Complete	3/29/00	2/23/00	5 w
	F Wedge Assemblies 80% Complete	5/3/00	4/26/00	1 w
	H-disks Ready	8/15/00	7/3/00	6 w
	M3-All Silicon Tracker Barrels/Disks Complete	8/25/00	8/25/00	0.2 w
	Central Silicon Complete & Ready To Move To DAB	9/18/00	9/18/00	0.2 w
	M1-Central Silicon Complete	9/18/00	9/18/00	0.2 w
	M2-Silicon Tracker Installed in Solenoid/Fiber Tracker	9/25/00	9/25/00	0.2 w

Areas of Concern

Technical

- Recently a problem with non-uniform depletion voltage across detectors was uncovered. Approximately 23% of sensors for CDF are affected and a similar or smaller number of sensors for DØ. Tests have been implemented to uncover this defect.
- There is a few percent failure rate for n-side capacitors at final bias voltage. Work is still underway to understand the final testing and burn-in specifications based on our experience with the first 30-40 ladders.
- The low yield of HDI stuffing at Promex is still a concern. As mentioned in the previous report, the company recently "lost" 14 F-disk HDIs. The laboratory was reimbursed for this loss, but it clearly delays the schedule. The first pass of HDIs received from Silitronics showed similar problems as Promex. The second batch had a yield similar to the Promex yield so we are hopeful that the yield for future batches will be higher at this company.
- Initial tests with various final low-mass cables of varying length showed a narrowing of clock signals that are driven by the SVX chip. Changing the termination at the sending and receiving end brought the signals again within good operating margin. Read-out errors occurred again when multiple low-mass cables were connected to one single interface board. The source of these errors is thought to be termination of the signals.

Schedule

- Ladder production for the single-sided detectors has been halted because of the non-availability of parts. The work on the 2-degree ladders has slowed due to some of the fixtures being out of specification. Currently three fixtures have been re-qualified and yield mechanically acceptable ladders. The last fixture for 2-degree detector production is being qualified.
- One fixture for the 90-degree detectors has been qualified during this month and production is being initiated.
- H-wedge production is progressing according to schedule. Full wedges have been built from half-wedges using a dual camera "bi-facial" fixture, and yield mechanically adequate wedges. Mounting of H-wedges on the cooling ring has been started.
- F wedge production has started and 13 wedge detectors have been built in December, one more than scheduled. F-disk production requires a working CMM in lab C. This machine has been inoperative since its arrival in December and will have a major schedule impact if not repaired within a week.

DØ Upgrade Monthly Progress Report

for the month of December, 1999

- A new idea for production of 2-degree detectors was conceived that eliminates one epoxy-curing step. It involves moving the ladder under vacuum from a CMM machine to a wirebonder and wirebonding the sensors before the rails are glued on. This procedure would increase production by 25% and looks promising.
- Delivery of sensors from Micron remains a concern. If the Micron delivery of 90-degree sensors falls behind, ladder production will come to a halt.
- Taking cosmic ray data has been delayed slightly because of read-out errors uncovered while running multiple low-mass cables. The schedule still calls for taking cosmic ray data in January.

Resources

There has been some influx of manpower during the last month. However, the effect of this additional manpower will not be felt immediately, due to the time required for training. Plans are being developed to train enough people to be able to work double shifts for the wirebonding machines. We do not have the ability to work multiple shifts for detector production, which might hamper us in the future.

Cost

Because of the low yield in mounting components of the flexible read-out circuits, we are forced to purchase additional parts. We are in the process of reviewing costs and available spares based on production and testing yield. The original 20% spares will not be sufficient, especially for parts used in the early phase of production, and additional parts will need to be ordered. A detailed accounting should be available next month. Costs have also increased for low-mass cables from Allied Signal and the interface card system.

Change Requests

None

Progress Summary

All detector types are now in production.

- A set of 13 F-wedges has been built this month.
- 80% of the 3-chip ladders have been built.
- 20% of the 9-chip ladders have been built.
- Eight 90-degree 6-chip ladders have been produced and the detectors are being tested.
- H-wedge production is well understood and is proceeding at the rate of ten per week. The procedure for building full wedges has been started and yields mechanically sound ladders. The first H-wedges have been mounted on the cooling ring.
- A team is now in place to test and repair ladders and wedges. The repair process is better understood, although problems remain. HDI and ladder burn-in systems are working well and are being used routinely by shift personnel. The low yields of HDI stuffing remains a problem.
- The 12-ladder test team is in place and has installed and measured mechanical ladders in barrels.
- The read out system is ready to take cosmic-ray data.

DØ Upgrade Monthly Progress Report

for the month of December, 1999

Subsystem: Fiber Tracker and VLPCs
WBS: 1.1.2
Date Submitted: 1/20/00
Submitted By: Alan D. Bross

<u>Done</u>	<u>Reportable Milestone</u>	<u>Date</u>	<u>Baseline</u>	<u>Variance</u>
	<i>Detector</i>			
X	M2 - Assembly Design Complete	3/5/99	3/5/99	0 w
X	M2-First Cylinder Complete	9/2/99	9/2/99	0 w
X	M3-Fiber Tracker Ribbon Fabrication 50% Complete	11/5/99	11/12/99	-0.9 w
	M2-Fiber Tracker Assembly Begun	2/1/00	12/6/99	6.2 w
	M3-Fiber Tracker Cylinders 8, 7, 6, and 5 Complete	3/2/00	1/28/00	5 w
	M3-Fiber Tracker Ribbon Fabrication Complete	3/20/00	3/6/00	2.1 w
	Waveguide Production 50% Complete	4/6/00	1/29/00	9.8 w
	M3-Fiber Tracker Ribbon Mounting Complete	5/5/00	4/20/00	2.2 w
	M2-Fiber Tracker Assembly Complete	5/19/00	5/4/00	2.2 w
	M3-Waveguide Production Complete	8/2/00	6/5/00	8.4 w
	<i>VLPCs</i>			
X	M2-VLPC Production 50% Complete	8/31/97	8/31/97	0 w
	M3-VLPC Cassette Assembly 50% Complete	6/5/00	4/12/00	7.4 w
	M3-VLPC Cryo System Operational	6/12/00	6/12/00	0 w
	M3-VLPC Cassette Assembly Complete	10/13/00	8/22/00	7.4 w

Areas of Concern

Technical

We are still waiting for delivery of VLPC cassette flex circuits. The 100-part prototype order has not yet been received.

Schedule

Completion of nesting cart final assembly and test. We are about 1 to 2 weeks behind schedule here.

Resources

Two additional technicians for lab 3 plus 2-shift operation on the CMM would give us a better chance of meeting the "Fiber Tracker Assembly Complete" milestone by its baseline date of 5/4/00.

Cost

None

Change Requests

None

Progress Summary

- Ribbon production is going well.
- Ribbon mounting for cylinder 8 is complete.
- Connector production in Fermilab village shop is progressing well – connectors are no longer a schedule issue.
- Although we have not started complete final assembly of any VLPC production cassettes, we are making good progress with sub-assembly fabrication.

DØ Upgrade Monthly Progress Report

for the month of December, 1999

Subsystem: Forward Preshower
WBS: 1.1.4
Date Submitted: 1/14/00
Submitted By: Abid Patwa

<u>Done</u>	<u>Reportable Milestone</u>	<u>Date</u>	<u>Baseline</u>	<u>Variance</u>
X	M2-Forward Preshower Module Fabrication Begun	11/4/98	11/4/98	0 w
	M3-1st Forward Preshower Detector Complete	2/10/00	1/12/00	4.2 w
	Module Fabrication and Testing Complete	2/25/00	12/10/99	9 w
	M3-2nd Forward Preshower Detector Complete	3/7/00	3/8/00	-0.2 w

Areas of Concern

Technical

Initial bonding and assembly of the lead absorber produced excellent results and the process is well understood. However, final production that maintains proper registration and alignment of all the bonded lead pieces awaits arrival of the outer support ring from the BNL heavy shop. This is expected in early January, 2000.

Schedule

In order to mitigate the delay in the arrival of elements from the BNL heavy shop and maintain the scheduled forward preshower detector completion date, assembly and alignment of other components continued so that the final assembly time will be as short as possible.

Resources

None

Cost

None

Change Requests

None

Progress Summary

- All modules (including specials) for the south FPS detector were fully cabled.
- Final installation and testing of the LED calibration systems in the small modules started.
- The certification of completed, fully functional modules to a stage that they are ready for installation into the detector support structure continued, with modules for the first and second layer of the south FPS complete as well as the first layer of the north FPS.
- Upon arrival of the lead inner support ring from the Stony Brook machine shop, mocking of the lead assembly with the 48 stainless steel pieces that hold the lead pieces together was performed. Final assembly awaits the outer support ring expected in early January, 2000.
- Alignment of the detector support rings, ribs, and module frames continued on the vertically-positioned spherical dome, and a simple method to align each layer during assembly in this vertical position was determined.
- Final design details for the outer mounting hardware that jointly supports both the FPS and ICD on the DØ end calorimeter cryostat head were addressed. The Stony Brook shop is scheduled to begin the machining of these parts, along with the inner FPS mounting elements, in January, 2000.
- Detailed discussions began with the Trigger and other subdetector groups concerning the full mapping logic of clear waveguides from the FPS detector to the VLPC readout system and the subsequent signal routing in the electronic chain.

DØ Upgrade Monthly Progress Report

for the month of December, 1999

Subsystem: Tracking Electronics
WBS: 1.1.5
Date Submitted: 1/17/00
Submitted By: Marvin Johnson

<u>Done</u>	<u>Reportable Milestone</u>	<u>Date</u>	<u>Baseline</u>	<u>Variance</u>
X	First Readout Crate Installed & Working	11/16/99	12/2/99	-2 w
	Multichip Modules Received	3/8/00	2/23/00	2 w
	10 Analog Boards Available	5/3/00	4/19/00	2 w
	10 Digital Boards Available	5/10/00	3/22/00	7 w
	Mixer Boards Ready	7/27/00	6/22/00	4.8 w

Areas of Concern

Technical

Noise level of the analog front-end boards.

Schedule

Depending on testing and the vendor's production rate, we may not get all of the multichip modules by March. This will not have any long-term impact because we will not be in a position to release the production of the Analog Front-end board before April.

Resources

None

Cost

None

Change Requests

None

Progress Summary

- Four crates of VRB readout are installed and fully functional. Lack of serial command link cards prevents us from running all crates simultaneously. Twenty-five serial command link cards will be available in January (only one per crate is required) so we expect multi-crate operation in early February.
- SVX sequencer production has been delayed further by the assembly house, but they expect to deliver most of the boards in January. Almost all of the cables are in hand so we hope to start cable installation in January.
- The multi-chip module was released for production and shipments should start in February.
- Digital motherboards and daughterboards have arrived and we expect the devices to be tested in January.
- The analog front-end board should be completed in late January with several boards fabricated in February.

DØ Upgrade Monthly Progress Report

for the month of December, 1999

Subsystem: Calorimeter Electronics
WBS: 1.2.1
Date Submitted: 1/6/00
Submitted By: Mike Tuts

<u>Done</u>	<u>Reportable Milestone</u>	<u>Date</u>	<u>Baseline</u>	<u>Variance</u>
X	SCA Testing Complete	11/23/99	12/15/99	-2.8 w
	M2-Calorimeter Preamp System Test Complete	4/4/00	3/31/00	0.4 w
	M3-Calorimeter CC,ECN Preamp Installation Complete	4/4/00	3/31/00	0.4 w
	Shaper Hybrid 50% Complete	5/9/00	5/9/00	0 w
	Daughterboard Vendor Production Complete	7/10/00	6/16/00	3 w
	Timing System Installed	8/18/00	8/18/00	0 w
	BLS Motherboard Assembly Complete	8/28/00	8/7/00	3 w
	M2-Calorimeter BLS Assembly Complete	10/17/00	9/26/00	3 w

Areas of Concern

Technical

- Cooling for the preamp boxes - Some of the proposed modifications to the cooling infrastructure look promising; and we are expecting to try a new heat exchanger soon.
- Larger-than-expected noise from the calibration system - We are making further measurements; but it is too early for definite conclusions.
- Printed circuit board assembly - Poor quality control at the preamp motherboard assembler, Chipco, has forced us to carry out a vendor visit to bring the problems (mostly unsoldered pins) to their attention; they are addressing the concerns, and we anticipate higher yields of working boards.

Schedule

- Elements of the BLS system (the daughter card) are delayed by about two weeks relative to the last report due to the late delivery of parts from the vendor and longer-than-estimated delays in board layout. Unless we can recover this slippage during construction or checkout, it will lead to a comparable delay in the start of cosmic-ray commissioning in late August/September. Ultimately we can recover this delay by shortening the duration of commissioning.
- We have confirmed the need to carry out major rework of the BLS power supplies. This involves the replacement of the power transformers which will require a significant amount of manpower. While this task does not drive the schedule, it places the BLS power supplies near the critical path for the BLS system.

Resources

We have hired a new contract electrical tech who is now working with the calorimeter group. We will require additional manpower to help in the near term with preamp and motherboard installation and testing, and with BLS crate modifications. Some of that work can be carried out with existing manpower, but we estimate that we will need the services of one additional FTE to carry out this work.

Cost

- The SCAs remain the principal cost risk. We have started a dialogue with the Fermilab Business Services Section to see if we can obtain additional SCAs from the vendor for free or at reduced rates because of the yield problems in the devices we currently hold. Business Services will be contacting the vendors with such a proposal. The cost risk is estimated to be about \$50k.
- There is some additional cost risk associated with the BLS daughter cards because of the complexity of the board. We are working with the vendors to bring the cost in line with our original cost estimate.

Change Requests

None

DØ Upgrade Monthly Progress Report

for the month of December, 1999

Progress Summary

- The 1,000 preamps being built by Taiyo-Yuden for the ICD group have been shipped and are in the U.S.
- The 1,000 H-species preamps ordered from our U.S. vendor have been released for production. That order will complete all preamps, including spares.
- About half (600) preamp motherboards are nearing assembly completion at the vendor.
- We are carrying out a burn-in test of 5,000 channels of the new preamps in our test system.
- Preamp power supply construction is 95% complete and two of the 24 new supplies are being installed in the detector for in-situ testing.
- We have started to interact with the online group to see that we will be able to monitor and control the preamp power supplies that have been installed using the new controls system.
- Prototype transformers have been ordered to begin the construction of prototype BLS power supplies.
- The first of eight final prototype BLS motherboards has been received and tested.
- 5,000 pre-production BLS shaper hybrids have been received and have undergone preliminary acceptance tests.
- Operational Readiness Clearance (ORC) documentation for the preamp system (power supplies, backplanes, motherboards, pulser system) is being prepared.

DØ Upgrade Monthly Progress Report

for the month of December, 1999

Subsystem: Intercryostat Detector
WBS: 1.2.2
Date Submitted: 1/13/00
Submitted By: Andy White

<u>Done</u>	<u>Reportable Milestone</u>	<u>Date</u>	<u>Baseline</u>	<u>Variance</u>
	M3-ICD Tile Modules Ready	3/3/00	1/18/00	6.6 w
	M2-ICD Modules Arrive at Fermilab	3/10/00	1/25/00	6.6 w
	Drawers Ready	3/16/00	12/14/99	11.4 w
	M3-InterCryostat Detectors Installed	3/17/00	2/1/00	6.6 w

Areas of Concern

Technical

- Rerouting of short WLS fibers was completed for the first 16 tiles to prevent breaks due to over-bending.
- No further word from Fiber Systems concerning fiber cable development – may need to find another vendor.
- DDK connector with nine WLS fibers is brittle and can shear off fibers. Therefore we will NOT glue fibers into the tile grooves – instead we will use hold-down T-pieces that could be removed to allow fiber replacement.

Schedule

- No I-type preamps yet – ICD tiles will probably not be tested with new electronics prior to installation.
- Do not yet know whether half of the ICD will be shipped to Fermilab in February, 2000 and the other half in March, 2000, or whether the both halves will be shipped together. This will depend on the forward preshower detector schedule.

Resources

We may lose a key student and need to find two other students to help with the final ICD construction in early 2000.

Cost

Cost of fiber cables not yet known

Change Requests

None

Progress Summary

- Fifteen supertiles have been tested with good results.
- Further design progress was made on the motherboards.
- Clear fiber has been ordered for the backplanes and fiber cables.
- All face-plates have been made for the electronics drawers.

DØ Upgrade Monthly Progress Report

for the month of December, 1999

Subsystem: Muon Central
WBS: 1.3.2
Date Submitted: 1/7/00
Submitted By: Tom Diehl

<u>Done</u>	<u>Reportable Milestone</u>	<u>Date</u>	<u>Baseline</u>	<u>Variance</u>
	PDT Commissioning Complete	8/7/00	6/9/00	8 w
	CFA Commissioning Complete	8/29/00	7/10/00	7.3 w

Areas of Concern

Technical

The PDT gas system is still using bottled gas. That limits us to operating only two PDTs at a time. Completion of the gas system now lies close to the critical path for completion of the PDT commissioning. A gas tech is now devoting a large part of his time to the system so that we do not incur further delays.

Schedule

The "PDT Commissioning Complete" milestone has slipped an additional three weeks since the last report. However, the very recent discussions about moving the EF toroid magnets onto the central platform sooner than is in the baseline schedule are encouraging, since that would allow us to commission the detectors attached to the EFs earlier and more efficiently, thereby mitigating the slippage.

The CFA scintillator commissioning milestone has been delayed another two weeks because of the expected late arrival date of production front-end electronics.

Resources

The most serious resource issue is the small number of physicists available for commissioning the three major detector subsystems that make up the central muon detector. There are now 2.2 FTE physicists and no post-docs, and prospects for additional help look poor. Eventually, this shortage may affect the commissioning effort if we fail to develop the tools required to operate and maintain increasing portions of the detectors.

Cost

None

Change Requests

None

Progress Summary

The central muon upgrade continues to do relatively well, despite the manpower shortage. Our schedule is driven by the arrival of electronics as opposed to mechanical infrastructure.

- The CFA installation work was completed on 12/15/99. Commissioning the first 10% of the CFA system awaits the availability of physicists.
- The calibration system has suffered some delay because the post-doc who was performing this work has left the experiment. We have identified a graduate student to lead the completion of this work. It is now expected to be finished by mid-February.

DØ Upgrade Monthly Progress Report

for the month of December, 1999

Subsystem: Muon Forward Trigger Detectors
WBS: 1.3.3
Date Submitted: 1/6/00
Submitted By: Dmitri Denisov

<u>Done</u>	<u>Reportable Milestone</u>	<u>Date</u>	<u>Baseline</u>	<u>Variance</u>
X	M2-Muon Forward Trigger Counter Assembly 10% Complete	10/12/98	10/12/98	0 w
	All Pixel Octants Assembled	4/4/00	4/4/00	0 w
	All Muon Forward Trigger Detector Planes Installed	9/15/00	8/25/00	2.8 w

Areas of Concern

Technical

None

Schedule

None

Resources:

Availability of Fermilab technicians and visitors from IHEP for assembly and testing.

Cost

None

Change Requests

None

Progress Summary

Project is on budget and on schedule.

DØ Upgrade Monthly Progress Report

for the month of December, 1999

Subsystem: Muon Forward Tracker
WBS: 1.3.4
Date Submitted: 1/6/00
Submitted By: Dmitri Denisov

<u>Done</u>	<u>Reportable Milestone</u>	<u>Date</u>	<u>Baseline</u>	<u>Variance</u>
X	M2-Muon Forward Tracker MDT Assembly 10% Complete	1/29/99	1/29/99	0 w
X	Arrival Of C-Layer MDT Modules At FNAL	11/3/99	10/22/99	1.7 w
	M2-All Muon Forward Tracker MDT Modules At Fermilab	2/11/00	3/10/00	-4 w
	B-Layer Octants Assembled	4/18/00	4/18/00	0 w
	Muon Forward Tracker B-Layer Planes Installed	6/9/00	6/15/00	-0.8 w
	All MDT Octants Assembled	7/14/00	7/14/00	0 w
	All MDT Planes Installed	8/4/00	8/4/00	0 w

Areas of Concern

Technical

- Availability of honeycomb panels for B- and C-layers.
- High electronics noise on A-layer assembled octants.

Schedule

None

Resources

Availability of Fermilab technicians and engineers (getting the number required by the resource-loaded schedule) and visitors from JINR.

Cost

Cost of some parts for MDT B- and C-layer octants could be higher than our baseline estimates, based on the material costs only and estimated before the final engineering drawings are finished. More definitive estimations are in progress.

Change Requests

None

Progress Summary:

Project is on schedule, but cost increase within subproject contingency is likely.

DØ Upgrade Monthly Progress Report

for the month of December, 1999

Subsystem: Muon Electronics
WBS: 1.3.5
Date Submitted: 01/12/00
Submitted By: Boris Baldin

<u>Done</u>	<u>Reportable Milestone</u>	<u>Date</u>	<u>Baseline</u>	<u>Variance</u>
X	MDT ADB Fabrication Complete	12/2/99	12/2/99	0 w
	MDC Fabrication Complete	1/24/00	12/13/99	4 w
	M2-Muon Electronics Preproduction Installation Complete	1/31/00	12/13/99	5 w
	FEB, CB Production Complete	2/14/00	1/3/00	6 w
	SFE, SRC Fabrication Complete	4/17/00	2/3/00	10.5 w
	MRC, MFC Production Complete	4/26/00	3/27/00	4.4 w

Areas of Concern

Technical

SFE, SRC projects are proceeding slowly due to technical difficulties and low manpower.

Schedule

The M2 milestone for the completion of the muon electronics preproduction installation has been delayed due to difficulties with the debugging of the scintillator front-end card (SFE), and the scintillator readout controller (SRC).

Resources

None

Cost

None

Change Requests

None

Progress Summary

- All muon electronics projects are in production except for the scintillator electronics and the muon fanout card (MFC).
- Front-end board (FEB) production is 71% complete, but we expect a delay in completion due to PDT control board (PCB) vendor delivery. Control board production is 5% complete.
- Muon digitizing card (MDC) production is 59% complete. Expect a delay of three weeks due to vendor delivery.
- MDT readout controller (MDRC) is awaiting arrival of the PNPI design engineer (visa paperwork in progress, expected at the end of January, 2000).

DØ Upgrade Monthly Progress Report

for the month of December, 1999

Subsystem: Trigger
WBS: 1.4.1-1.4.5
Date Submitted: 1/18/00
Submitted By: Gerald C. Blazey

<u>Done</u>	<u>Reportable Milestone</u>	<u>Date</u>	<u>Baseline</u>	<u>Variance</u>
X	SLICs Received	12/10/99	11/10/99	4 w
	Preproduction MTCxx, MTFB, and MTCM Complete	1/24/00	1/24/00	0 w
	M3-Establish Single Crate Internal Data Movement	2/17/00	1/6/00	6 w
	M3- Cal Readout Available to L2	4/5/00	2/11/00	7.6 w
	Alpha Cards Received	5/15/00	5/15/00	0 w
	MBTs Received	5/18/00	3/16/00	9 w
	M3-L3 Operational	6/1/00	6/1/00	0 w
	Production MTCxx, MTFB, and MTCM Complete	6/27/00	6/27/00	0 w
	M3-Muon Level 1 Trigger Preproduction Testing Complete	7/6/00	4/18/00	11 w
	Global Installation Complete	7/21/00	7/12/00	1.4 w
	L2 Muon Installation Complete	7/31/00	7/26/00	0.6 w
	L2 CTT Installation Complete	8/7/00	8/9/00	-0.4 w
	L2 Cal Installation Complete	9/5/00	8/21/00	2 w
	M3-Trigger Level 2 Commissioned	10/3/00	9/21/00	1.6 w

Areas of Concern

Technical

None

Schedule

- The six week variance for the " Establish Single Crate Internal Data Movement" milestone is due to delay in the arrival of a pre-production magic bus transceiver (MBT) at Fermilab. The device is now expected to arrive in late January and then two to three weeks will be required to integrate high-level device drivers with data movement code. We have been developing code offline and so expect minimal, if any, schedule delay.
- The 7.6 week variance in the "Cal Readout Available to L2" milestone is due to the unavailability of engineers; since there was considerable schedule slack associated with this milestone, there will be little impact on the final schedule.
- The "MBT's Received" milestone is expected to slip about nine weeks due to slower-than-expected pre-production; this can be accommodated within the available schedule slack.

Resources

Engineering resources were identified for the Level 1 tracking trigger mixer boards, however resources are insufficient for completion of the 12-MCM analog front-end boards. An engineering physicist and perhaps engineering help may be useful.

Cost

We are exploring foreign funding sources for the mixer box and forward proton detector trigger components.

Change Requests

None

DØ Upgrade Monthly Progress Report

for the month of December, 1999

Progress Summary

- The Serial Command Link, which interfaces the framework with the front-end readout crates, has been released for production.
- Design of the Level 1 calorimeter electronics began. Testing of Level 1 muon preproduction modules continued at Arizona and Boston, and work has also started on the Level 1 muon platform infrastructure. Production of Level 1 central tracking Multi Chip Modules (MCM) has started. A complete set of digital trigger components also has arrived, with testing to begin in January. Fermilab engineering help for the Mixer Boards was identified.
- Progress has been rapid for design and construction of the Level 2 components: parts ordering continued for the alpha card, assembly of the MBT preproduction cards commenced, final orders for the SLIC DSP's have been placed, and CIC and SFO prototyping continued. Good progress on all the preprocessor and global code has been made. A mini-review of the Level 2 silicon track trigger (STT) was held at Fermilab.
- The trigger group has taken the initiative to organize VHDL classes for the training of physicists as trigger programmers. Maintenance of the DAQ systems has been continuous at DØ and the various test stands. Substantial progress has been made on the code required to operate the VRC components. The trigger simulator also has added components.

DØ Upgrade Monthly Progress Report

for the month of December, 1999

Subsystem: Online
WBS: 1.5.1
Date Submitted: 1/24/00
Submitted By: Stuart Fuess

<u>Done</u>	<u>Reportable Milestone</u>	<u>Date</u>	<u>Baseline</u>	<u>Variance</u>
X	Steady DAQ Running	4/20/00	3/31/00	2.7 w

Areas of Concern

Technical

None

Schedule

None

Personnel

None

Cost

None

Change Requests

None

Progress Summary

During December the Online group focused on the steps necessary towards achieving the integration milestones in March and April. As most of the functional requirements of the Online system have been demonstrated, the goal of this next period of activity is to produce a system easier to configure, adapt, and use for commissioning activities. The milestone noted above is one in which a DAQ system is available for continuous use.

We have addressed the specific issues of:

- Control and downloading of hardware associated with the central muon system
- Control and downloading of hardware associated with the calorimeter
- Common control of DAQ processes
- Initialization of DAQ processes
- Parameters for event data streaming
- Structure of ORACLE databases for configuration and calibration
- Secondary DAQ path (via control system) for commissioning use
- Event metadata transport to Offline computing systems
- Communication with accelerator control system

The Online group is expanding its efforts to communicate with the various Detector groups concerning commissioning needs. We have designated liaisons for each Detector group. We expect our efforts to reach out to understand specific needs will be important in assuring that the Online systems will be in place before the detectors arrive at DØ.

DØ Upgrade Monthly Progress Report

for the month of December, 1999

December '99 Financial Summary

The first quarter of fiscal year 2000 closed with obligations for the DØ Upgrade Project totaling \$1,665K on equipment M&S funds and \$43K on Solenoid AIP Plant funds. A spending plan, which shows that spending is now exceeding the plan for FY00, has been downloaded from the current Project schedule. Because the latest version of the Upgrade Project Cost Estimate still needs to be loaded into the Project's schedule, the probability for changes to this spending plan is high. The Project was allocated an M&S budget of \$3,104K during November. DØ expects to spend the full FY00 budget. The remaining DoE funding of \$400K will be allocated during fiscal year 2001.

The M&S Upgrade Project balance is currently \$4,469K, excluding contingency. Contributions to the Upgrade currently total \$1,800K. These contributions help to reduce the M&S balance. The DØ Spokespersons are in the process of negotiating additional contributions, but at this time, these funds are still unspecified. The balance in AIP funds is \$277K. Once the Solenoid Project is complete, the unobligated AIP balance will be transferred to Upgrade M&S Equipment as budget dollars to be spent in either FY00 or FY01. Although some claims have been made on the contingency total presented at the November DoE review, management will continue to watch spending closely in an effort to reduce further decreases in the total contingency. All sub-project managers are continuously asked to review spending and if necessary, reevaluate cost estimates. See the following table and chart for further details concerning budget and spending.

The Project currently has commitments with universities and other institutions in the DØ Collaboration, via active Memoranda of Understanding (MoU), totaling \$8,733K. These funds represent an obligation on the part of the DØ Upgrade Project and are regularly costed each month via invoices received from these institutions as work is completed. In addition, several institutions have made significant contributions to the DØ Upgrade. A list of the universities and other institutions involved as well as a more detailed breakdown of the commitments and costs follows.

DØ Upgrade Monthly Progress Report

for the month of December, 1999

FY00 Financial Report as of 12/31/99

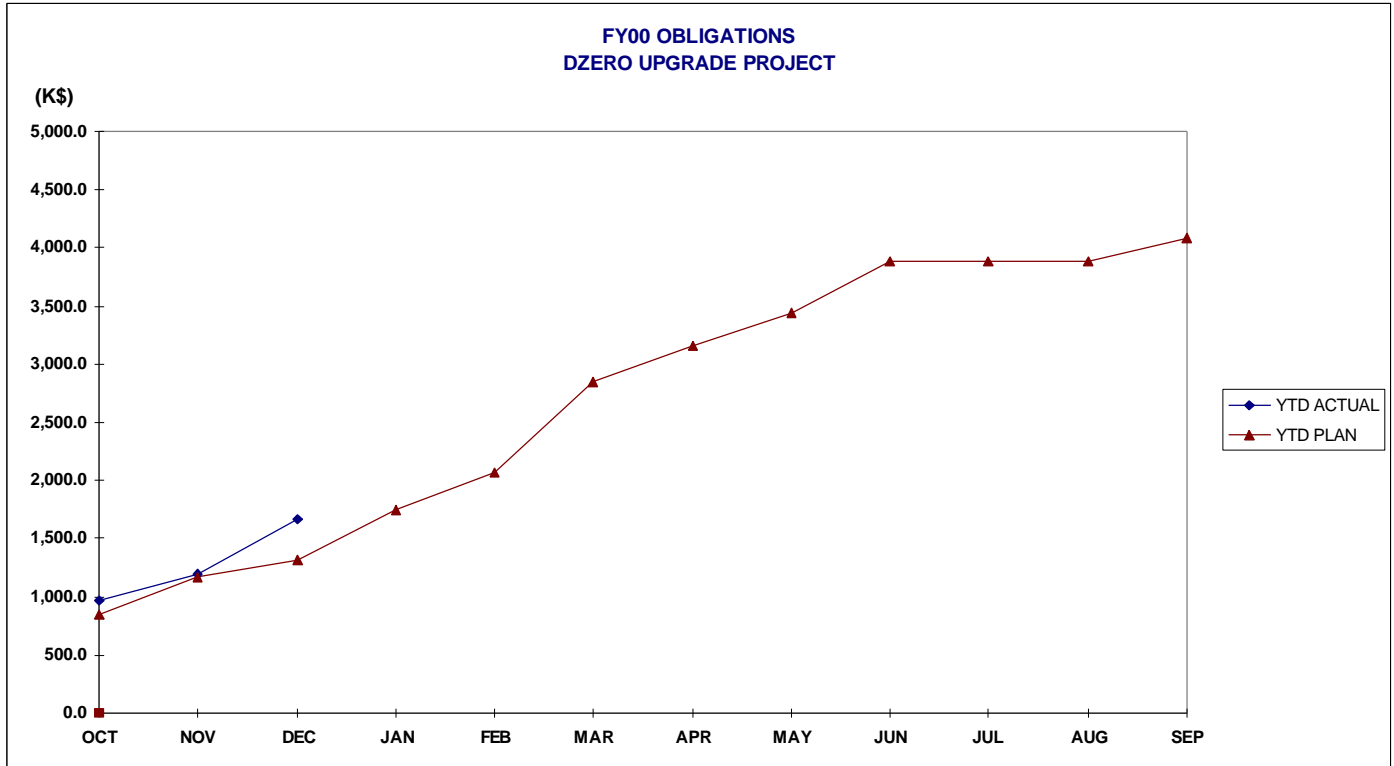
	<u>COST</u> <u>ESTIMATE</u>	<u>PRIOR YR</u> <u>OBLIG</u>	<u>FY 00</u> <u>YTD OBLIG</u>	<u>PROJECT</u> <u>BALANCE</u>
1 TOTAL DZERO UPGRADE PROJECT	40,351.2	34,217.7	1,664.6	4,468.9
1.1 TRACKING DETECTORS	19,137.5	16,777.7	1,261.5	1,098.2
1.1.1 SILICON TRACKER	7,578.6	6,162.9	815.4	600.4
1.1.2 FIBER TRACKER	7,281.1	6,976.3	366.6	-61.8
1.1.3 CENTRAL PRESHOWER DETECTOR	238.1	238.2	0.0	-0.1
1.1.4 FORWARD PRESHOWER DETECTOR	510.9	500.3	0.0	10.6
1.1.5 TRACKING ELECTRONICS	3,528.7	2,900.0	79.6	549.1
1.2 CALORIMETER	4,618.1	4,161.6	40.4	416.0
1.2.1 FRONT-END ELECTRONICS	4,315.8	3,913.8	36.1	365.9
1.2.2 INTERCRYOSTAT DETECTOR	302.2	247.9	4.3	50.1
1.3 MUON DETECTORS	9,284.7	7,791.9	295.5	1,197.3
1.3.1 COSMIC RAY SCINTILLATOR	1,223.2	963.2	0.0	260.0
1.3.2 CENTRAL TRIGGER DETECTORS	910.3	720.6	32.2	157.4
1.3.3 FORWARD TRIGGER DETECTOR	2,033.6	1,635.3	20.0	378.3
1.3.4 FORWARD TRACKING DETECTOR	1,213.4	936.5	126.4	150.5
1.3.5 FRONT-END ELECTRONICS	3,904.3	3,536.2	116.9	251.1
1.4 TRIGGER	6,588.9	5,193.1	12.3	1,383.5
1.4.1 FRAMEWORK	1,859.4	1,859.4	0.0	0.0
1.4.2 LEVEL 0	136.4	124.2	0.0	12.2
1.4.3 LEVEL 1	1,427.9	1,120.0	12.3	295.6
1.4.4 LEVEL 2	2,079.8	1,275.9	0.0	803.9
1.4.5 LEVEL 3	1,085.5	813.7	0.0	271.8
1.5 ONLINE EQUIPMENT	722.0	293.4	54.8	373.8
1.5.1 ON-LINE EQUIPMENT	722.0	293.4	54.8	373.8
3.1 TOTAL SOLENOID PROJECT	5,168.0	4,848.2	42.9	276.8
3.1.1 SOLENOID	5,168.0	4,848.2	42.9	276.8

DEFINITION OF TERMS:

Funds:	DØ Upgrade = M&S Equipment Funds; Solenoid = AIP Plant Funds.
Cost Estimate:	Total Project and Sub-Project Budgets without contingency.
Prior Year Obligations:	Obligations for fiscal years '92 through '99 as applicable.
FY 00 Year-to-Date Obligations:	Obligations for fiscal year '00.
Project Balance:	Cost Estimate - (Prior Year Obligations + Fiscal 00 YTD Obligations)
DØ FY 00 Plan:	The M&S funds allocated to the Project/Sub-Projects as extracted from the current schedule.
DØ FY 00 Balance:	DØ FY 00 Plan - FY 00 Year-to-Date Obligations

DØ Upgrade Monthly Progress Report

for the month of December, 1999



	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
YTD ACTUAL	962.6	1,199.8	1,664.6									
YTD PLAN	843.0	1,164.0	1,316.0	1,754.0	2,076.0	2,845.0	3,158.0	3,439.0	3,884.0	3,884.0	3,884.0	4,086.0

DØ Upgrade Monthly Progress Report

for the month of December, 1999

Active MOUs as of 12/31/99

	<u>EQUIPMENT</u>	<u>R&D</u>	<u>COSTED</u>
Boston University	298,200	5,200	8,776
Brookhaven National Laboratory	236,439		154,630
Brown University	856,867	106,000	152,644
California State University, Fresno	26,160		646
Columbia University, Nevis Labs	140,000		107,937
DAPNIA / Saclay	0	0	0
IN2P3	0	0	0
Indiana University	65,000		13,618
Institute for High Energy Physics (IHEP)	404,512	15,000	218,414
Joint Institute for Nuclear Research (JINR)	996,902	22,000	935,398
Kansas State University	298,620	100,012	152,725
Louisiana Tech University	80,854		40,579
Michigan State University	1,445,027		1,011,951
Moscow State University	238,400		219,200
NIKHEF / Amsterdam	0	0	0
Northern Illinois University	133,000	18,000	103,600
SUNY at Stony Brook	1,105,750	20,000	172,670
University of Arizona	747,648	65,500	354,411
University of Calif, Davis		9,720	0
University of Calif, Irvine	48,800		28,449
University of Calif, Riverside	89,116		84,310
University of IL, Chicago	129,103	22,000	91,042
University of Kansas, Center for Research, Inc.	16,000		0
University of Maryland	221,000		173,124
University of Michigan	206,500		167,897
University of Nebraska, Lincoln	95,913		0
University of Notre Dame	167,000	77,000	222,774
University of Oklahoma	43,000		28,755
University of Texas, Arlington	126,764		87,371
<u>University of Washington</u>	<u>50,640</u>	<u>5,250</u>	<u>38,538</u>
 Total Fermilab Funds:	 <u>\$8,267,215</u>	 <u>\$465,682</u>	
 Total Costed:	 4,329,434	 240,024	 <u>\$4,569,458</u>
 Total Open Commitments:	 <u>\$3,937,781</u>	 <u>\$225,658</u>	

DØ Upgrade Monthly Progress Report

for the month of December, 1999

Reportable Milestones Summary

<u>Done</u>	<u>Reportable Milestones</u>	<u>Project</u>	<u>Date</u>	<u>Baseline</u>	<u>Var.</u>
X	M1-Solenoid Delivered to Fermilab	Solenoid	5/12/97	5/12/97	0 w
X	M2-VLPC Production 50% Complete	VLPCs	8/31/97	8/31/97	0 w
X	M2-Central Preshower Module Fabrication Complete	Central Preshower	12/16/97	12/16/97	0 w
X	M2-Central Preshower Installed on Solenoid	Central Preshower	5/21/98	5/21/98	0 w
X	M1-Solenoid Installed and Tested	Solenoid	9/30/98	9/30/98	0 w
X	M2-Muon Forward Trigger Counter Assembly 10% Complete	Muon Forward Trigger	10/12/98	10/12/98	0 w
X	M2-Forward Preshower Module Fabrication Begun	Forward Preshower	11/4/98	11/4/98	0 w
X	M2-Muon Forward Tracker MDT Assembly 10% Complete	Muon Forward Tracker	1/29/99	1/29/99	0 w
X	M2 - Assembly Design Complete	Fiber Tracker	3/5/99	3/5/99	0 w
X	M2-First Cylinder Complete	Fiber Tracker	9/2/99	9/2/99	0 w
X	H Half-Wedge Fabrication 20% Complete	Silicon Tracker	10/15/99	10/15/99	0 w
X	3 Chip Ladder Fabrication 80% Complete	Silicon Tracker	10/26/99	10/20/99	0.6 w
X	Arrival Of C-Layer MDT Modules At FNAL	Muon Forward Tracker	11/3/99	10/22/99	1.68 w
X	9 Chip Ladder Fabrication 20% Complete	Silicon Tracker	11/4/99	11/3/99	0.2 w
X	M3-Fiber Tracker Ribbon Fabrication 50% Complete	Fiber Tracker	11/5/99	11/12/99	-0.91 w
X	First Readout Crate Installed & Working	Silicon Electronics	11/16/99	12/2/99	-2 w
X	SCA Testing Complete	Calorimeter Electronics	11/23/99	12/15/99	-2.8 w
X	MDT ADB Fabrication Complete	Muon Electronics	12/2/99	12/2/99	0 w
X	SLICs Received	Trigger	12/10/99	11/10/99	4 w
	6 Chip Ladder Fabrication 20% Complete	Silicon Tracker	1/19/00	1/3/00	2.35 w
	F Wedge Assemblies 20% Complete	Silicon Tracker	1/24/00	1/19/00	0.5 w
	MDC Fabrication Complete	Muon Electronics	1/24/00	12/13/99	4 w
	Preproduction MTCxx, MTFB, and MTCM Complete	Trigger	1/24/00	1/24/00	0 w
	M2-Muon Electronics Preproduction Installation Complete	Muon Electronics	1/31/00	12/13/99	5 w
	M2-Fiber Tracker Assembly Begun	Fiber Tracker	2/1/00	12/6/99	6.2 w
	M2-First Silicon Tracker Barrel/Disk Module Complete	Silicon Tracker	2/2/00	1/24/00	1.4 w
	M3-1st Forward Preshower Detector Complete	Forward Preshower	2/10/00	1/12/00	4.2 w
	M2-All Muon Forward Tracker MDT Modules At Fermilab	Muon Forward Tracker	2/11/00	3/10/00	-4 w
	FEB, CB Production Complete	Muon Electronics	2/14/00	1/3/00	6 w
	M3-Establish Single Crate Internal Data Movement	Trigger	2/17/00	1/6/00	6 w
	Module Fabrication and Testing Complete	Forward Preshower	2/25/00	12/10/99	9 w
	M3-Fiber Tracker Cylinders 8, 7, 6, and 5 Complete	Fiber Tracker	3/2/00	1/28/00	5 w
	M3-ICD Tile Modules Ready	Intercryostat Detector	3/3/00	1/18/00	6.6 w
	M3-2nd Forward Preshower Detector Complete	Forward Preshower	3/7/00	3/8/00	-0.2 w
	Multichip Modules Received	Fiber Electronics	3/8/00	2/23/00	2 w
	M3-Level Ø-South Installed	Luminosity Monitor	3/9/00	2/9/00	4.2 w
	M2-ICD Modules Arrive at Fermilab	Intercryostat Detector	3/10/00	1/25/00	6.6 w
	9 Chip Ladder Fabrication 8 Complete	Silicon Tracker	3/10/00	3/27/00	-2.2 w
	Drawers Ready	Intercryostat Detector	3/16/00	12/14/99	11.4 w
	M3-InterCryostat Detectors Installed	Intercryostat Detector	3/17/00	2/1/00	6.6 w
	M3-Fiber Tracker Ribbon Fabrication Complete	Fiber Tracker	3/20/00	3/6/00	2.1 w
	6 Chip Ladder Fabrication 8 Complete	Silicon Tracker	3/21/00	3/14/00	1 w
	H Half-Wedge Fabrication 8 Complete	Silicon Tracker	3/29/00	2/23/00	5 w
	M2-Calorimeter Preamp System Test Complete	Calorimeter Electronics	4/4/00	3/31/00	0.4 w
	M3-Calorimeter CC,ECN Preamp Installation Complete	Calorimeter Electronics	4/4/00	3/31/00	0.4 w
	All Pixel Octants Assembled	Muon Forward Trigger	4/4/00	4/4/00	0 w
	M3- Cal Readout Available to L2	Trigger	4/5/00	2/11/00	7.6 w
	Waveguide Production 5 Complete	Fiber Tracker	4/6/00	1/29/00	9.76 w
	SFE, SRC Fabrication Complete	Muon Electronics	4/17/00	2/3/00	10.5 w
	B-Layer Octants Assembled	Muon Forward Tracker	4/18/00	4/18/00	0 w
	Steady DAQ Running	Online	4/20/00	3/31/00	2.7 w
	MRC, MFC Production Complete	Muon Electronics	4/26/00	3/27/00	4.4 w
	10 Analog Boards Available	Fiber Electronics	5/3/00	4/19/00	2 w

DØ Upgrade Monthly Progress Report

for the month of December, 1999

F Wedge Assemblies 8 Complete	Silicon Tracker	5/3/00	4/26/00	1 w
M3-Fiber Tracker Ribbon Mounting Complete	Fiber Tracker	5/5/00	4/20/00	2.2 w
Shaper Hybrid 5 Complete	Calorimeter Electronics	5/9/00	5/9/00	0 w
10 Digital Boards Available	Fiber Electronics	5/10/00	3/22/00	7 w
Alpha Cards Received	Trigger	5/15/00	5/15/00	0 w
MBTs Received	Trigger	5/18/00	3/16/00	9 w
M2-Fiber Tracker Assembly Complete	Fiber Tracker	5/19/00	5/4/00	2.2 w
M3-L3 Operational	Trigger	6/1/00	6/1/00	0 w
M3-VLPC Cassette Assembly 5 Complete	VLPCs	6/5/00	4/12/00	7.4 w
Muon Forward Tracker B-Layer Planes Installed	Muon Forward Tracker	6/9/00	6/15/00	-0.8 w
M3-VLPC Cryo System Operational	VLPCs	6/12/00	6/12/00	0 w
Production MTCxx, MTFB, and MTCM Complete	Trigger	6/27/00	6/27/00	0 w
M3-Muon Level 1 Trigger Preproduction Testing Complete	Trigger	7/6/00	4/18/00	11 w
Daughterboard Vendor Production Complete	Calorimeter Electronics	7/10/00	6/16/00	3 w
All MDT Octants Assembled	Muon Forward Tracker	7/14/00	7/14/00	0 w
Global Installation Complete	Trigger	7/21/00	7/12/00	1.4 w
Mixer Boards Ready	Fiber Electronics	7/27/00	6/22/00	4.8 w
L2 Muon Installation Complete	Trigger	7/31/00	7/26/00	0.6 w
M3-Waveguide Production Complete	Fiber Tracker	8/2/00	6/5/00	8.4 w
All MDT Planes Installed	Muon Forward Tracker	8/4/00	8/4/00	0 w
PDT Commissioning Complete	Muon Central	8/7/00	6/9/00	8 w
L2 CTT Installation Complete	Trigger	8/7/00	8/9/00	-0.4 w
H-disks Ready	Silicon Tracker	8/15/00	7/3/00	6 w
Timing System Installed	Calorimeter Electronics	8/18/00	8/18/00	0 w
M3-All Silicon Tracker Barrels/Disks Complete	Silicon Tracker	8/25/00	8/25/00	0.2 w
BLS Motherboard Assembly Complete	Calorimeter Electronics	8/28/00	8/7/00	3 w
CFA Commissioning Complete	Muon Central	8/29/00	7/10/00	7.3 w
L2 Cal Installation Complete	Trigger	9/5/00	8/21/00	2 w
All Muon Forward Trigger Detector Planes Installed	Muon Forward Trigger	9/15/00	8/25/00	2.8 w
Central Silicon Complete & Ready To Move To DAB	Silicon Tracker	9/18/00	9/18/00	0.2 w
M1-Central Silicon Complete	Silicon Tracker	9/18/00	9/18/00	0.2 w
M2-Silicon Tracker Installed in Solenoid/Fiber Tracker	Silicon Tracker	9/25/00	9/25/00	0.2 w
M3-Trigger Level 2 Commissioned	Trigger	10/3/00	9/21/00	1.6 w
M3-VLPC Cassette Assembly Complete	VLPCs	10/13/00	8/22/00	7.4 w
M2-Calorimeter BLS Assembly Complete	Calorimeter Electronics	10/17/00	9/26/00	3 w
M2-Muon End Toroids Installed on Platform	Master	11/15/00	11/15/00	0.2 w
M1-Begin Shield Wall Removal/Ready to Roll-in	Master	12/6/00	11/22/00	1.6 w
M1-Detector Rolled-in and Hooked Up	Master	2/6/01	2/2/01	0.4 w